PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appeal No. _____

Application No.:	10/791,428
Filing Date:	March 2, 2004
Appellants:	William S. Wheat et al.
Conf. No.:	5404
Group Art Unit:	1795
Examiner:	Cynthia K. Lee
Title:	FUEL CELL ENERGY MANAGEMENT SYSTEM FOR COLD ENVIRONMENTS
Attorney Docket:	8540G-83/COB

APPEAL BRIEF

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March 11, 2010

Sir:

This brief on Appeal is submitted pursuant to the Notice of Appeal filed on February 12, 2010, in response to the Notice of Panel Decision from Pre-Appeal Brief Review mailed February 24, 2010, and in response to the Final Office Action mailed December 14, 2009.

TABLE OF CONTENTS

I. REAL PARTY IN INTEREST

The real party in interest is GM Global Technology Operations, Inc., by virtue of assignments recorded in the Patent and Trademark Office at Reel 022092, Frame 0737.

The United States Department of Treasury may have an interest pursuant to a security agreement recorded in the Patent and Trademark Office at Reel 023156, Frame 0052.

The UAW Retiree Medical Benefits Trust may have an interest pursuant to a security agreement recorded in the Patent and Trademark Office at Reel 023162, Frame 0001.

II. RELATED APPEALS AND INTERFERENCES

The Assignee, the Appellants, and the undersigned do not know of any other appeals, interferences, or judicial proceedings that would directly affect or that would be directly affected by, or have a bearing on, the Board's decision in this Appeal.

III. STATUS OF THE CLAIMS

Claims 1-22 and 35-46 have been cancelled. Claims 23-34 and 47-54 are pending and stand rejected. Claims 27-28, 30-34, and 47-54 are allowed. (See p. 2 of the Final Office Action of December 14, 2009).

Appellants appeal the rejection of claims 23-34 and 47-54.

IV. STATUS OF THE AMENDMENTS

The claims have not been amended subsequent to the Final Office Action, and there are no un-entered amendments.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

Independent claim 23 recites an energy management system for controlling the temperature of a fuel cell system of a vehicle (e.g., #100, FIG. 2; see paragraph [0027], lines 1-3), comprising: a fuel cell stack (e.g., #102, FIG. 2; see paragraph [0027], lines 2-3); an air supply providing air to said fuel cell stack (e.g., #112, FIG. 2; see paragraph [0027], lines 4-5); a water supply (e.g., #150, FIG. 2; see paragraph [0029], line 5); a hydrogen supply (e.g., #120, FIG. 2; see paragraph [0027], line 6); a heater that is connected to an output of said fuel cell stack, that is arranged to warm said stack and said water supply, and that is external to said fuel cell stack (e.g., #136 and #148, FIG. 2; see paragraph [0029], lines 2-5); and a controller that controls said hydrogen supply and said air supply to power said heater to warm said fuel cell stack and said water supply when said vehicle is not running (e.g., #160, FIG. 2; see paragraph [0031], lines 4-10).

Independent claim 27 recites an energy management system for controlling the temperature of a fuel cell system of a vehicle (e.g., #100, FIG. 2; see paragraph [0027], lines 1-3), comprising: a fuel cell stack (e.g., #102, FIG. 2; see paragraph [0027], lines 2-3); an air supply providing air to said fuel cell stack (e.g., #112, FIG. 2; see paragraph [0027], lines 4-5); a water supply (e.g., #150, FIG. 2; see paragraph [0029], line 5); a hydrogen supply (e.g., #120, FIG. 2; see paragraph [0027], line 6); a heater that is connected to an output of said fuel cell stack, that is arranged to warm said stack and said water supply, and that is external to said fuel cell stack (e.g., #136 and #148, FIG. 2; see paragraph [0029], lines 2-5); a pressure sensor that generates a hydrogen pressure signal for said hydrogen supply and that is connected to said controller (e.g., #174, FIG. 2; see paragraph [0030], lines 10-11); a stack temperature sensor that is connected to said controller and that generates a stack temperature signal (e.g., #108, FIG. 2; see paragraph [0027], lines 3-4); and a controller that controls said hydrogen supply and said air supply to power said heater to warm said fuel cell stack and said water supply when said vehicle is not running (e.g., #160, FIG. 2; see paragraph [0031], lines 4-10), wherein said controller determines whether heating is necessary based on

said stack temperature if said hydrogen pressure signal exceeds a first pressure value (e.g., #160, FIG. 2; see paragraph [0037], lines 1-7).

Independent claim 30 recites an energy management system for controlling the temperature of a fuel cell system of a vehicle (e.g., #100, FIG. 2; see paragraph [0027], lines 1-3), comprising: a fuel cell stack (e.g., #102, FIG. 2; see paragraph [0027], lines 2-3); an air supply providing air to said fuel cell stack (e.g., #112, FIG. 2; see paragraph [0027], lines 4-5); a water supply (e.g., #150, FIG. 2; see paragraph [0029], line 5); a hydrogen supply (e.g., #120, FIG. 2; see paragraph [0027], line 6); a heater that is connected to an output of said fuel cell stack, that is arranged to warm said stack and said water supply, and that is external to said fuel cell stack (e.g., #136 and #148, FIG. 2; see paragraph [0029], lines 2-5); a pressure sensor that generates a hydrogen pressure signal for said hydrogen supply and that is connected to said controller (e.g., #174, FIG. 2; see paragraph [0030], lines 10-11); a stack temperature sensor that is connected to said controller and that generates a stack temperature signal; (e.g., #108, FIG. 2; see paragraph [0027], lines 3-4); an ambient temperature sensor that generates an ambient temperature signal; and a water tank sensor that generates a water temperature signal (e.g., #154, FIG. 2; see paragraph [0029], lines 7-8); and a controller that controls said hydrogen supply and said air supply to power said heater to warm said fuel cell stack and said water supply when said vehicle is not running (e.g., #160, FIG. 2; see paragraph [0031], lines 4-10), wherein said controller uses said stack temperature signal, said ambient temperature signal and said water temperature signal to access a lookup table to determine whether heating is necessary when said pressure signal does not exceed a first pressure value (e.g., #160, FIG. 2; see paragraph [0033], lines 1-6).

Independent claim 47 recites an energy management system for controlling the temperature of a fuel cell system of a vehicle (e.g., #100, FIG. 2; see paragraph [0027], lines 1-3), comprising: a fuel cell stack (e.g., #102, FIG. 2; see paragraph [0027], lines 2-3); an air supply providing air to said fuel cell stack (e.g., #112, FIG. 2; see paragraph [0027], lines 4-5); a water supply (e.g., #150, FIG. 2; see paragraph [0029], line 5); a hydrogen supply (e.g., #120, FIG. 2; see paragraph [0027], line 6); a heater that is connected to an output of said fuel cell stack, that is arranged to warm said stack and

said water supply, and that is external to said fuel cell stack (e.g., #136 and #148, FIG. 2; see paragraph [0029], lines 2-5); a pressure sensor that generates a hydrogen pressure signal for said hydrogen supply (e.g., #174, FIG. 2; see paragraph [0030], lines 10-11); a stack temperature sensor that generates a stack temperature signal (e.g., #108, FIG. 2; see paragraph [0027], lines 3-4); and a controller that determines whether heating is necessary based on said stack temperature signal if said hydrogen pressure signal exceeds a first pressure value (e.g., #160, FIG. 2; see paragraph [0037], lines 1-7) and that selectively controls said hydrogen supply and said air supply to power said heater to warm said fuel cell stack and said water supply (e.g., #160, FIG. 2; see paragraph [0031], lines 6-10).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Appellants seek the Board's review of:

(a) whether claims 23, 24, and 26 are unpatentable under 35 U.S.C. § 102(b) over U.S. Pat. No. 6,186,254 ("Mufford").

(b) whether claim 25 is unpatentable under 35 U.S.C. § 103(a) over Mufford as applied to claim 23, in view of U.S. Pat. No. 6,592,741 ("Nakanishi").

(c) whether claim 29 is unpatentable under 35 U.S.C. § 103(a) over Mufford as applied to claim 23, in view of U.S. Pub. No. 2004/0185316 ("Wells") and U.S. Pub. No. 2002/0192467 ("Ballentine").

VII. ARGUMENTS

A. Rejection of Claims 23, 24, and 26 under 35 U.S.C. § 102(b) over U.S. Pat. No. 6,186,254 ("Mufford")

With respect to claim 23, Mufford fails to disclose a controller that controls a hydrogen supply and an air supply to power a heater to warm a fuel cell stack and a water supply **while a vehicle is not running**.

1. Anticipation

A reference need not *expressly* disclose a claim limitation to support a finding of anticipation. Instead, anticipation may be found where a reference *inherently* discloses one or more claim limitations. However, "[a] claim is anticipated **only if** each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987) (emphasis added); see M.P.E.P. § 2131.

2. Mufford does not expressly disclose all of the limitations of Claim 23

Pursuant to the Pre-Appeal Conference held at Appellants' request of March 31, 2009, the Examiner acknowledges Mufford's failure to expressly teach a controller that controls a hydrogen supply and an air supply to power a heater to warm a fuel cell stack and a water supply while a vehicle is not running. (See Page 2 of the Non-Final Office Action of June 22, 2009).

Since that Pre-Appeal Conference, however, the Examiner has improperly refused to afford the limitations of the controller of claim 23 any patentable weight. (See Page 2, lines 8-9 of the Non-Final Office Action of June 22, 2009). Specifically, despite the explicit limitations of the controller of claim 23, the Examiner refuses to afford any weight to the limitation of controlling a hydrogen supply and an air supply to power a heater to warm a fuel cell stack and a water supply **while a vehicle is not running**. (See Page 2, lines 13-14 of the Non-Final Office Action of June 22, 2009).

In contrast with claim 23, Mufford only describes operating a fuel cell for warming while the vehicle of Mufford **is running**. For example, Mufford states that "[f]uel cell

power may be advantageously used to power the resistor soon after start-up . . .." (See column 4, lines 39-40). Mufford also states that fuel cell power may be used "**during operation** . . . especially **when the motor vehicle is operated** in cool ambient temperatures." (See column 4, lines 42-46) (emphasis added). Appellants note, however, that Mufford is **silent** as to the fuel cell 30 powering the resistive heater of Mufford while the vehicle is not running.

Therefore, Mufford fails to expressly disclose a controller that controls a hydrogen supply and an air supply to power a heater to warm a fuel cell stack and a water supply while a vehicle is not running as claim 23 recites.

3. Mufford does not inherently disclose all of the limitations of Claim 23

The Examiner acknowledges that the Examiner's position is not based on inherency. (See last paragraph of the Continuation Sheet of the Advisory Action of January 29, 2010). However, the Examiner alleges that the fuel cell of Mufford "is capable of operating (and thus heating the heater) with or without the vehicle motor running." (See p. 6, lines 1-3 of the Final Office Action of December 14, 2009).

Appellants respectfully note that the fact that a certain characteristic simply **may** occur or be present in a prior art reference is **not** sufficient to establish inherency of that characteristic. *In re Rijckaert*, 28 USPQ.2d 1955, 1957 (Fed. Cir. 1993) (emphasis added). Instead, as stated by the Federal Circuit:

> [t]o establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is **necessarily** present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities.'

In re Robertson, 49 USPQ.2d 1949, 1950-1951 (Fed. Cir. 1999) (emphasis added). In other words, "[i]n relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic **necessarily** flows from the teachings of the applied prior art." *Ex Parte Levy*, 17 USPQ.2d 1461 (Bd. Pat. App. & Inter. 1990) (emphasis original).

Here, the Examiner failed to provide any basis or technical reasoning that Mufford **necessarily** controls a hydrogen supply and an air supply to power a heater to warm a fuel cell stack and a water supply **while a vehicle is not running**. Instead, the alleged capabilities of the system of Mufford appear to be solely the Examiner's opinion as Mufford only describes operating a fuel cell for warming while the vehicle of Mufford **is running**. Accordingly, Appellants respectfully asserts that Mufford does not inherently teach controlling a hydrogen supply and an air supply to power a heater to warm a fuel cell stack and a water supply **while a vehicle is not running** and that a rejection based on inherency is therefore improper.

The Examiner alleges that the limitation of controlling a hydrogen supply and an air supply to power a heater to warm a fuel cell stack and a water supply while a vehicle is not running is a statement of intended or desired use. (See third paragraph of the Continuation Sheet of the Advisory Action of January 29, 2010). The Examiner also alleges that "[i]f the prior art structure is capable of performing the intended use, then it meets the claim." (See fifth paragraph of the Continuation Sheet of the Advisory Action of January 29, 2010).

First, the limitation of controlling a hydrogen supply and an air supply to power a heater to warm a fuel cell stack and a water supply while a vehicle is not running is a **functional limitation** of the controller of claim 23 - not an intended or desired use. M.P.E.P. § 2173.05(g) expressly states that "there is nothing inherently wrong with defining some part of an invention in functional terms."

M.P.E.P. § 2173.05(g) explains that "[a] functional limitation is often used in association with an element, ingredient, or step of a process to define a particular capability or purpose that is served by the recited element, ingredient or step." In claim 23, the limitation of controlling a hydrogen supply and an air supply to power a heater to warm a fuel cell stack and a water supply while a vehicle is not running is a particular capability or purpose that is served by the controller.

M.P.E.P. § 2173.05(g) also states that "[a] functional limitation must be evaluated and considered, just like any other limitation of the claim, for what it fairly conveys to a person of ordinary skill in the pertinent art in the context in which it is used." Appellants

respectfully submit that one of ordinary skill in the art would understand the functional limitations of claim 23 impart structural limitations upon the controller of claim 23. More specifically, the structure of the controller of claim 23 is such that the controller controls a hydrogen supply and an air supply to power a heater to warm a fuel cell stack and a water supply while a vehicle is not running. The Examiner's refusal to afford the limitations of claim 23 any weight is therefore improper.

Second, Appellants again note that the fact that a certain characteristic simply **may** occur or be present in a prior art reference is **not** sufficient to establish inherency of that characteristic. *In re Rijckaert*, 28 USPQ.2d 1955, 1957 (Fed. Cir. 1993) (emphasis added). In other words, the fact that a reference may be capable of performing a claim limitation does not establish that the reference actual performs the claim limitation. In this case, as acknowledged by the Examiner, Mufford teaches operating the fuel cell stack of Mufford while the vehicle of Mufford **is running**.

4. Conclusion

The Court of Appeals for the Federal Circuit has recently stated: "We thus hold that unless a reference discloses within the four corners of the document not only all of the limitations claimed but also all of the limitations arranged or combined in the same way as recited in the claim, it cannot be said to prove prior invention of the thing claimed and, thus, cannot anticipate under 35 U.S.C. §102 . . .." *Net MoneyIN Inc. v. VeriSign Inc.*, 88 USPQ.2d 1751, 1759-1760 (Fed. Cir. 2008). Here, Mufford fails to teach a controller that controls a hydrogen supply and an air supply to power a heater to warm a fuel cell stack and a water supply **while a vehicle is not running** as claim 23 explicitly recites.

For at least the above reasons, claim 23 is in condition for allowance. Claims 24-26 and 29 depend from claim 23 and, therefore, are in condition for allowance for at least similar reasons.

B. Rejection of Claim 25 under 35 U.S.C. § 103(a) over Mufford as applied to Claim 23, in view of U.S. Pat. No. 6,592,741 ("Nakanishi")

To establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *See, e.g., In re Vaeck*, 947 F.2d 488, 20 USPQ.2d 1438 (Fed. Cir. 1991).

Nakanishi does not remedy the deficiencies of Mufford with respect to claim 23 from which claims 25 depends. Therefore, claim 25 is in condition for allowance for at least similar reasons as claim 23.

Appellant's position with respect to claim 25 should not be understood as implying that no other reasons for the patentability of claim 25 exists. Appellants reserve the right to address these other reasons at a later date if needed.

C. Rejection of Claim 29 under 35 U.S.C. § 103(a) over Mufford as applied to Claim 23, in view of U.S. Pub. No. 2004/0185136 ("Wells") and U.S. Pub. No. 2002/0192467 ("Ballentine")

To establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *See, e.g., In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Neither Wells nor Ballentine remedies the deficiencies of Mufford with respect to claim 23 from which claims 29 depends. For at least these reasons, claim 29 is in condition for allowance for at least similar reasons as claim 23.

Appellants' position with respect to claim 29 should not be understood as implying that no other reasons for the patentability of claim 29 exists. Appellants reserve the right to address these other reasons at a later date if needed.

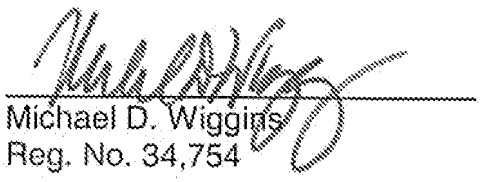
CONCLUSION

Appellants respectfully request the Board to reverse the Examiner's rejection of the claims on appeal.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

HARNESS, DICKEY, & PIERCE, P.L.C.

By: 
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CLAIMS APPENDIX

This is a complete and current listing of the claims.

1-22. (Cancelled)

23. (Previously Presented) An energy management system for controlling the temperature of a fuel cell system of a vehicle, comprising:

a fuel cell stack;

an air supply providing air to said fuel cell stack;

a water supply;

a hydrogen supply;

a heater that is connected to an output of said fuel cell stack, that is arranged to warm said stack and said water supply, and that is external to said fuel cell stack; and

a controller that controls said hydrogen supply and said air supply to power said heater to warm said fuel cell stack and said water supply when said vehicle is not running.

24. (Previously Presented) The energy management system of Claim 23 wherein said heater is a resistive heater.

25. (Previously Presented) The energy management system of Claim 23 further comprising: a pressure sensor that generates a hydrogen pressure signal for said hydrogen supply and that is connected to said controller.

26. (Previously Presented) The energy management system of Claim 25 further comprising: a stack temperature sensor that is connected to said controller and that generates a stack temperature signal.

27. (Previously Presented) An energy management system for controlling the temperature of a fuel cell system of a vehicle, comprising:

a fuel cell stack;

an air supply providing air to said fuel cell stack;

a water supply;

a hydrogen supply;

a heater that is connected to an output of said fuel cell stack, that is arranged to warm said stack and said water supply, and that is external to said fuel cell stack;

a pressure sensor that generates a hydrogen pressure signal for said hydrogen supply and that is connected to said controller;

a stack temperature sensor that is connected to said controller and that generates a stack temperature signal; and

a controller that controls said hydrogen supply and said air supply to power said heater to warm said fuel cell stack and said water supply when said vehicle is not running, wherein said controller determines whether heating is necessary based on said stack temperature if said hydrogen pressure signal exceeds a first pressure value.

28. (Previously Presented) The energy management system of Claim 27 wherein said controller initiates said air supply and said hydrogen supply if heating is necessary until said stack temperature signal exceeds a first stack temperature value.

29. (Previously Presented) The energy management system of Claim 26 further comprising: an ambient temperature sensor that generates an ambient temperature signal; and a water tank sensor that generates a water temperature signal.

30. (Previously Presented) An energy management system for controlling the temperature of a fuel cell system of a vehicle, comprising:

a fuel cell stack;

an air supply providing air to said fuel cell stack;

a water supply;

a hydrogen supply;

a heater that is connected to an output of said fuel cell stack, that is arranged to warm said stack and said water supply, and that is external to said fuel cell stack;

a pressure sensor that generates a hydrogen pressure signal for said hydrogen supply and that is connected to said controller;

a stack temperature sensor that is connected to said controller and that generates a stack temperature signal;

an ambient temperature sensor that generates an ambient temperature signal; and a water tank sensor that generates a water temperature signal; and

a controller that controls said hydrogen supply and said air supply to power said heater to warm said fuel cell stack and said water supply when said vehicle is not running, wherein said controller uses said stack temperature signal, said ambient temperature signal and said water temperature signal to access a lookup table to determine whether heating is necessary when said pressure signal does not exceed a first pressure value.

31. (Previously Presented) The energy management system of Claim 30 further comprising: a hydrogen tank level sensor that generates a tank level signal.

32. (Previously Presented) The energy management system of Claim 31 wherein said controller initiates said air supply and said hydrogen supply if heating is necessary and if said tank level signal exceeds a first tank level value.

33. (Previously Presented) The energy management system of Claim 32 wherein said controller continues heating until said stack temperature signal exceeds a first stack temperature value.

34. (Previously Presented) The energy management system of Claim 31 wherein said controller activates a purge, drains water from said water supply, and inhibits vehicle startup if said tank level signal does not exceed a first tank level value.

35-46. (Cancelled)

47. (Previously Presented) An energy management system for controlling the temperature of a fuel cell system supplying power to a load, comprising:

a fuel cell stack;

an air supply providing air to said fuel cell stack;

a water supply;

a hydrogen supply;

a heater that is connected to an output of said fuel cell stack, that is arranged to warm said stack and said water supply, and that is external to said fuel cell stack;

a pressure sensor that generates a hydrogen pressure signal for said hydrogen supply;

a stack temperature sensor that generates a stack temperature signal; and

a controller that determines whether heating is necessary based on said stack temperature signal if said hydrogen pressure signal exceeds a first pressure value and that selectively controls said hydrogen supply and said air supply to power said heater to warm said fuel cell stack and said water supply.

48. (Previously Presented) The energy management system of Claim 47 wherein said controller initiates said air supply and said hydrogen supply if heating is necessary until said stack temperature signal exceeds a first stack temperature value.

49. (Previously Presented) The energy management system of Claim 47 further comprising: an ambient temperature sensor that generates an ambient temperature signal; and a water tank sensor that generates a water temperature signal.

50. (Previously Presented) The energy management system of Claim 49 wherein said controller uses said stack temperature signal, said ambient temperature signal and said water temperature signal to access a lookup table to determine whether heating is necessary when said pressure signal does not exceed a first pressure value.

51. (Previously Presented) The energy management system of Claim 50 further comprising: a hydrogen tank level sensor that generates a tank level signal.

52. (Previously Presented) The energy management system of Claim 51 wherein said controller initiates said air supply and said hydrogen supply if heating is necessary and if said tank level signal exceeds a first tank level value.

53. (Previously Presented) The energy management system of Claim 52 wherein said controller continues heating until said stack temperature signal exceeds a first stack temperature value.

54. (Previously Presented) The energy management system of Claim 51 wherein said controller activates a purge, drains water from said water supply, and inhibits vehicle startup if said tank level signal does not exceed a first tank level value.

VIII. EVIDENCE APPENDIX

None

IX. RELATED PROCEEDINGS APPENDIX

None

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